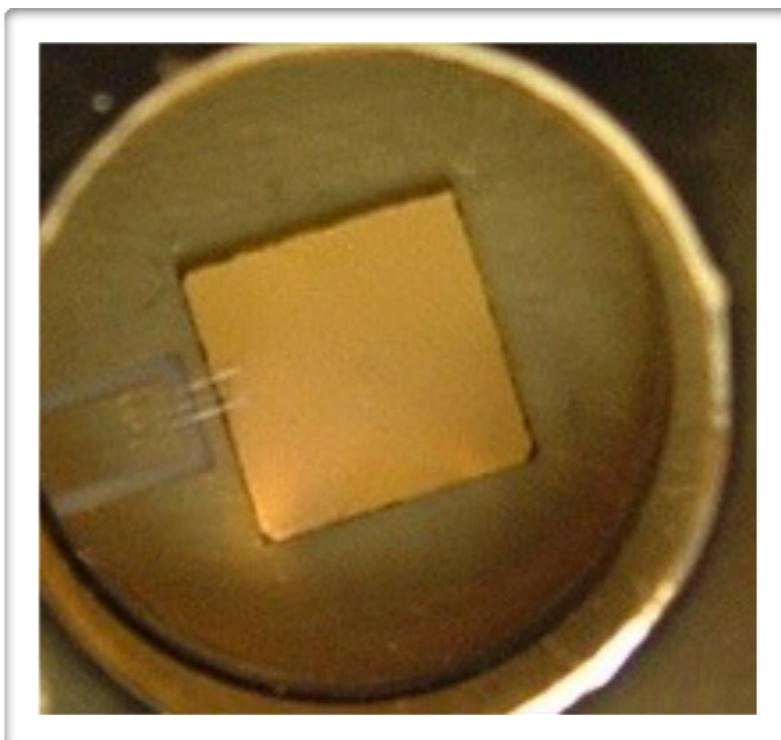




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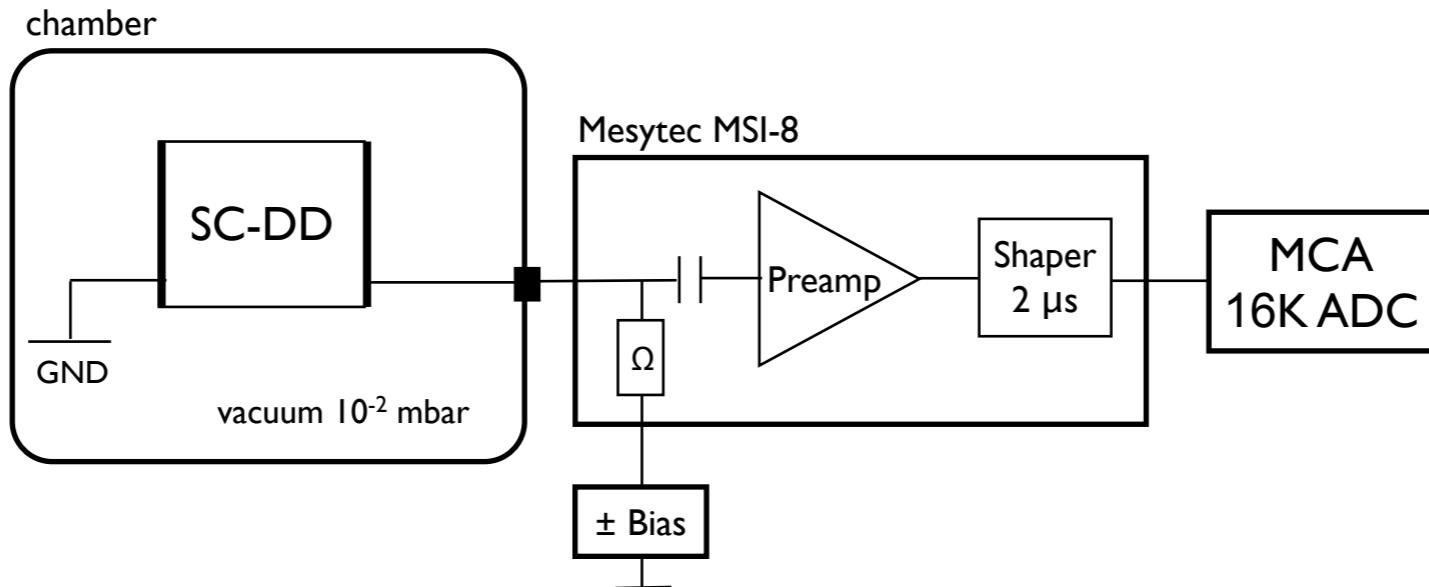
Characterization of Thin Diamond Detectors

Jose Dueñas & Ismael Martel
Department of Applied Physics
Huelva University
Spain

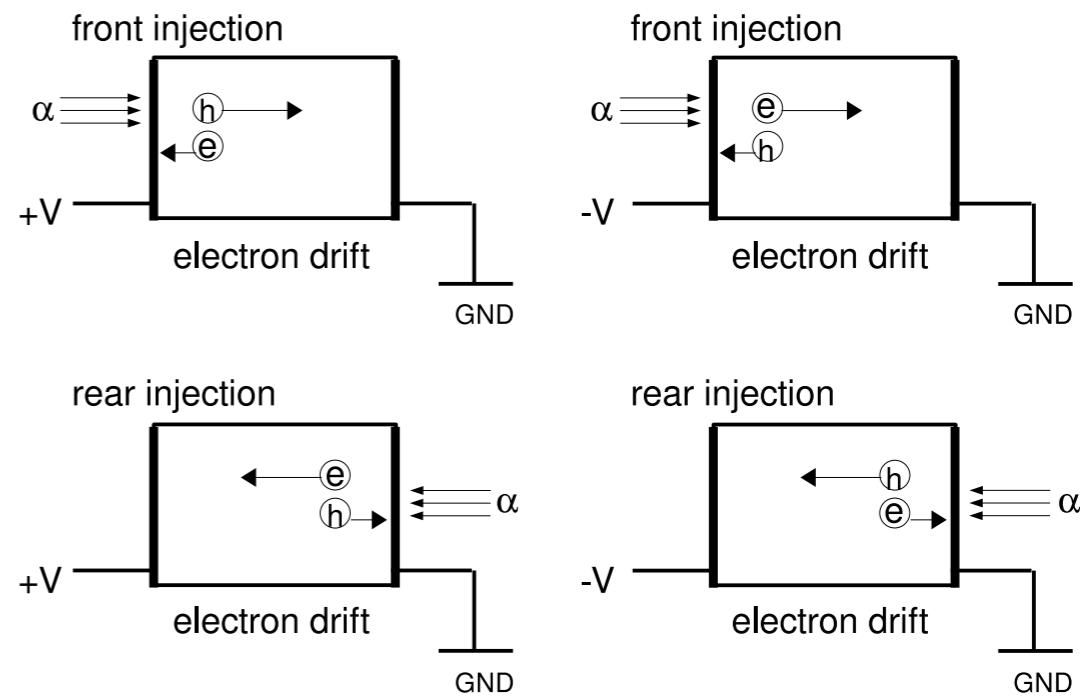




Methodology for characterization



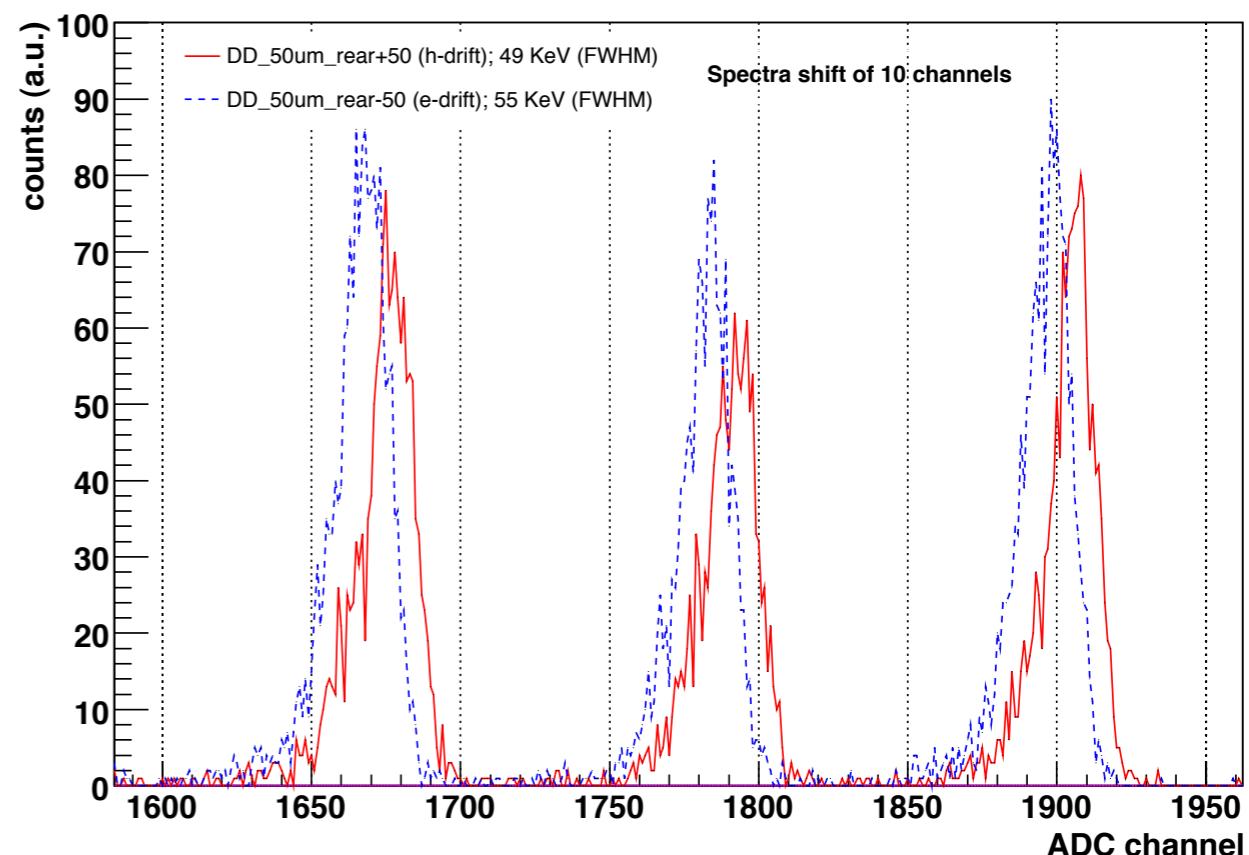
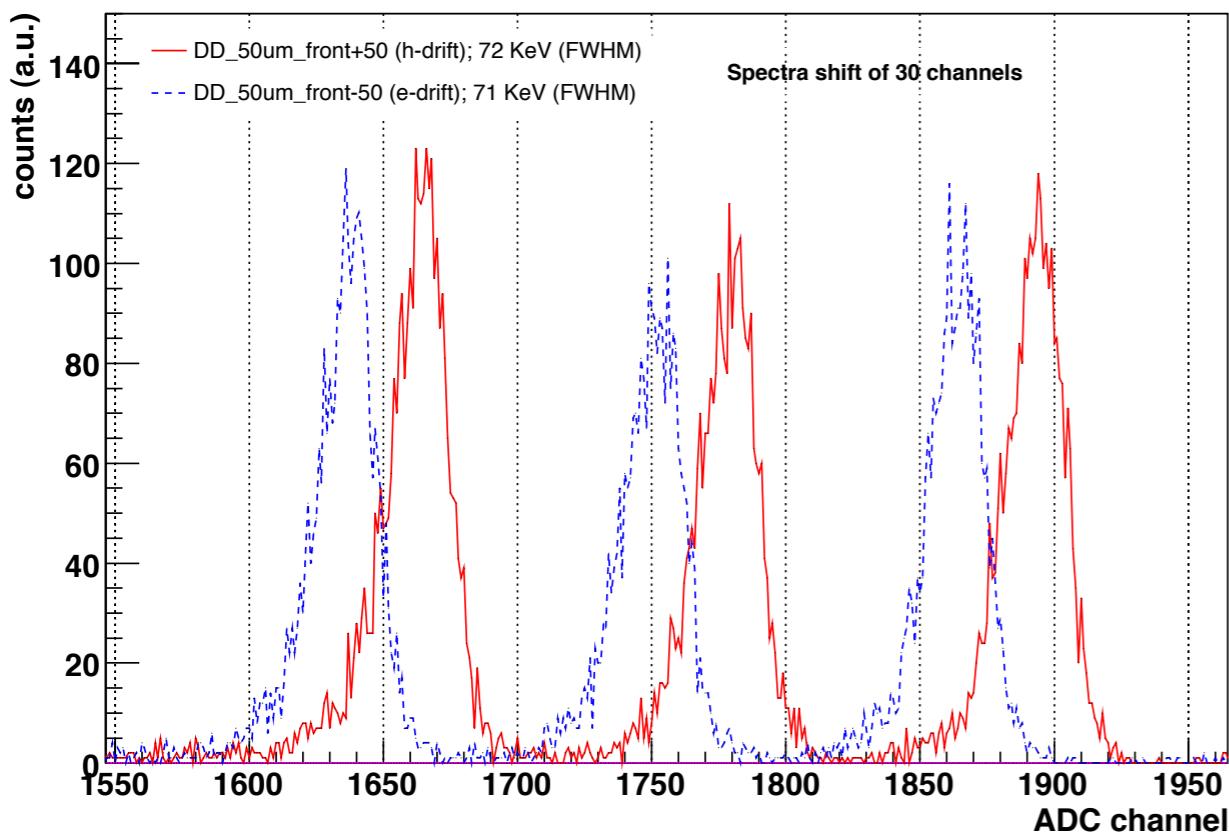
- ✿ Photons (laser), MIP (^{90}Sr), α 's (^{241}Am).
- ✿ α -source simplest and realistic.
- ✿ Short depth range, $\approx 13 \mu\text{m}$ for α 's.
- ✿ Transmission mounted DDs.
- ✿ Particle injection sides.
- ✿ Study performed on a $50 \mu\text{m}$ SC-DD.
- ✿ Diamond Detector LTD & UHU





Spectroscopy characterization (Energy resolution)

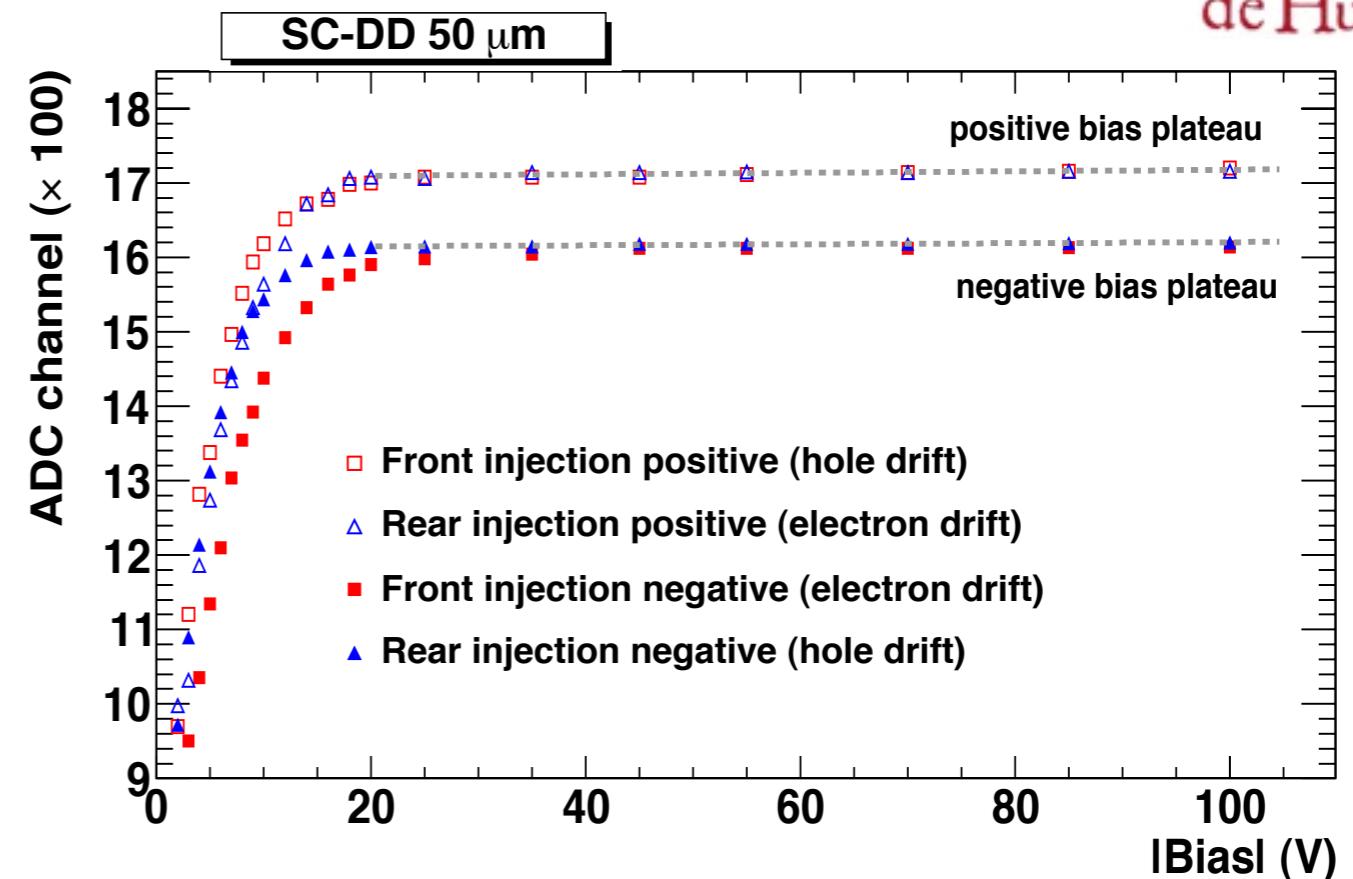
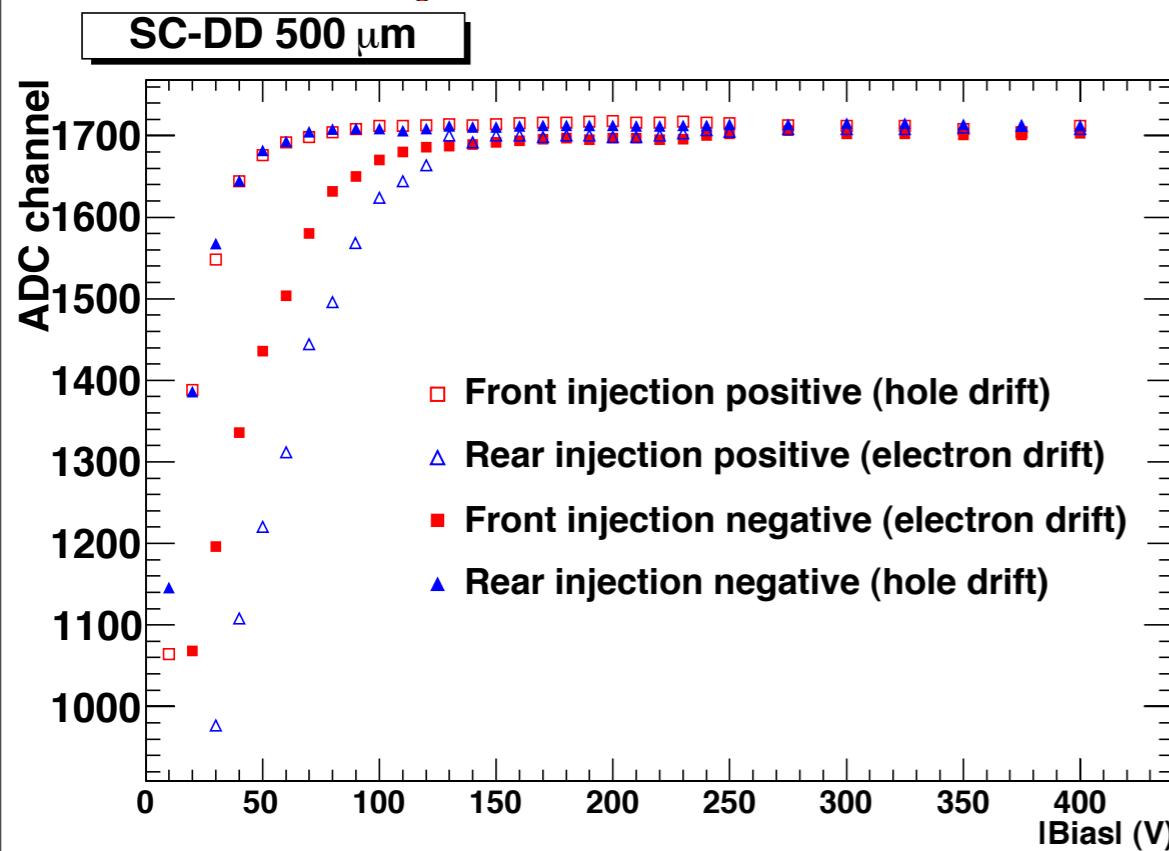
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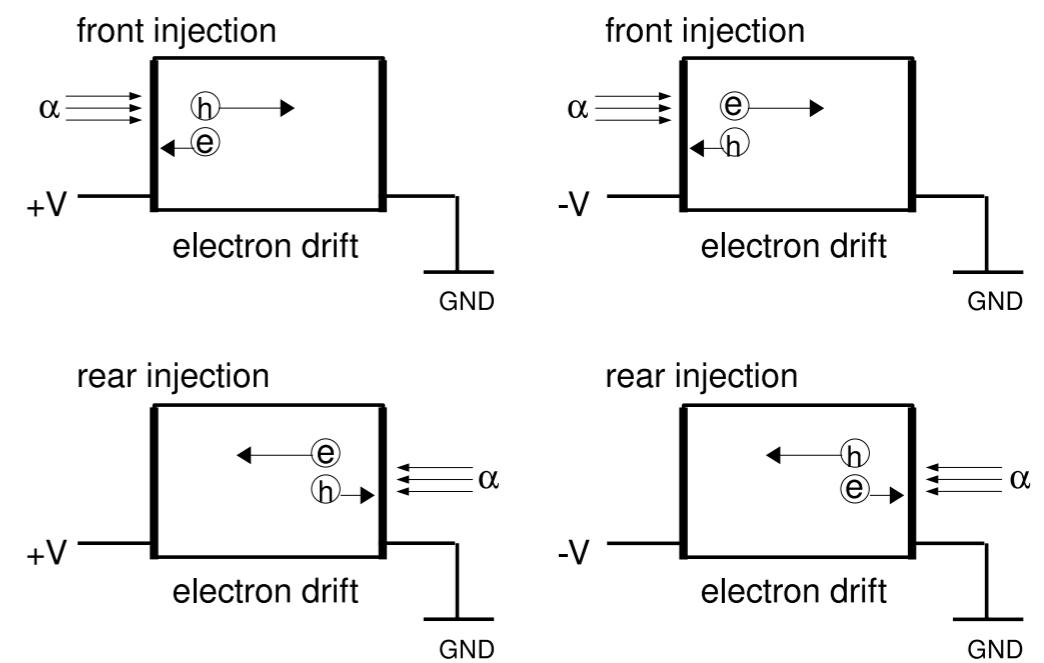
- ✿ Good ΔE already reported 20 keV.
- ✿ ΔE changes with the injection contact.
- ✿ E shift with polarization.
- ✿ We've got $\Delta E=50$ keV
- ✿ ΔE limited by our electronics.
- ✿ DLC/Pt/Au contact identically done?
- ✿ Low cps to avoid polarization effect.
- ✿ Dielectric effect with polarization.

Spectroscopy characterization (Charge collection)

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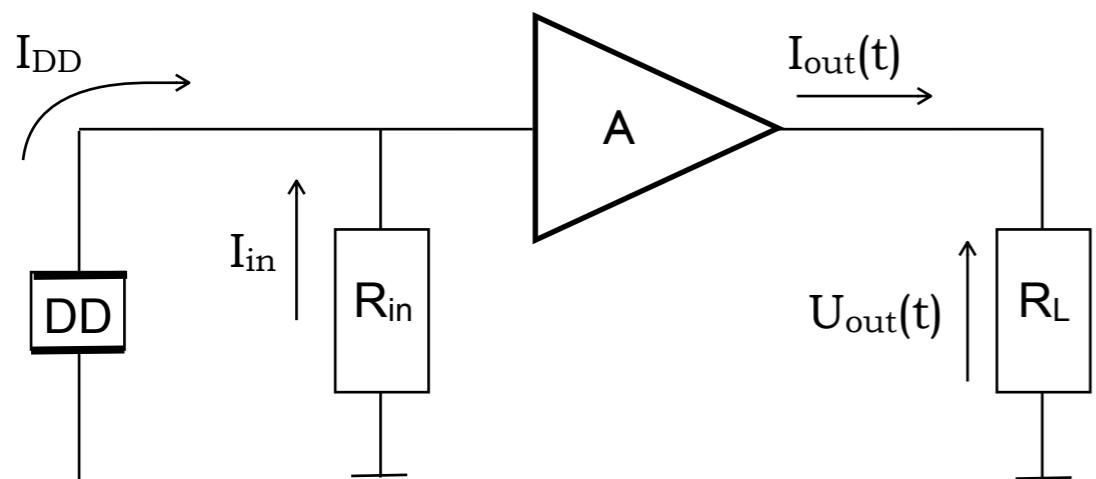
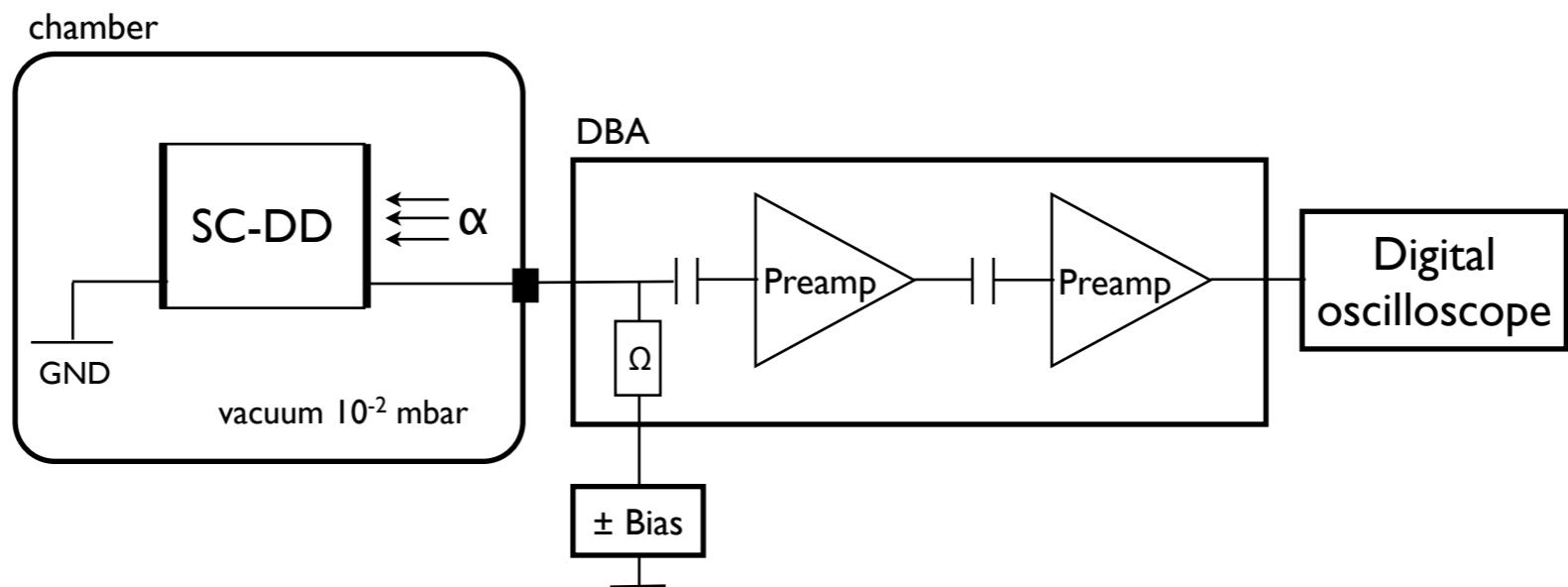
- ✿ Higher efficiency for positive bias.
- ✿ Difference at low V between front/rear.
- ✿ Same charge at lower voltage $C=Q/V$
- ✿ Are contacts blocking the holes?





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Timing characterization (Electronics)



$$I_{out}(t) = I_{DD} + I_{in}$$

$$I_{out}(t) = \frac{1}{A \cdot R_{in}} \cdot \left[R_{in} \cdot C_{in} \cdot \frac{d U_{out}(t)}{dt} + U_{out}(t) \right]$$

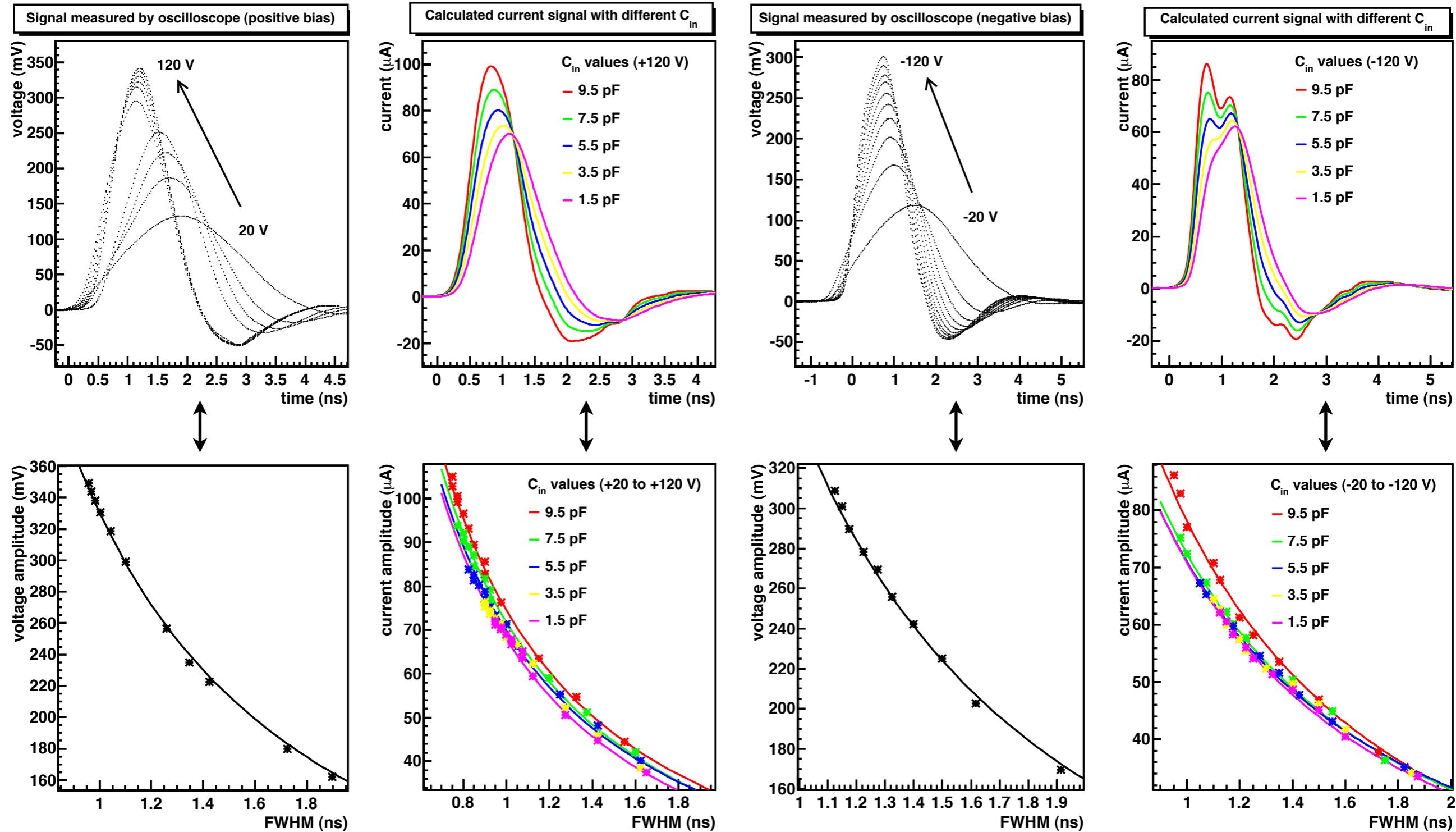
$$C_{in} = C_{detector} + C_{cable}$$

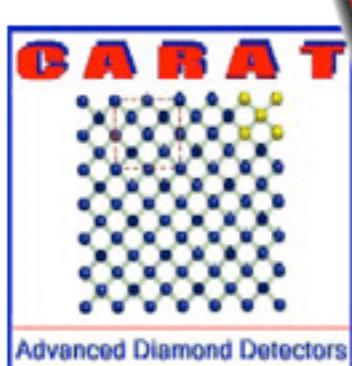
$U_{out}(t) \Rightarrow$ voltage measured by the oscilloscope



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Timing characterization (Pulse Shape)





Coming up next ...

- ✿ More thin samples are going to be delivered by DDL.
- ✿ PCB supporting the DD design to be 50Ω .
- ✿ PSA study using from protons to carbon beam.
- ✿ Theoretical model for calculating the mobility.
- ✿ $I-V$ bench test will be buy and setup at UHU.

OPEN TO SUGGESTION
&
FUTURE COLLABORATION